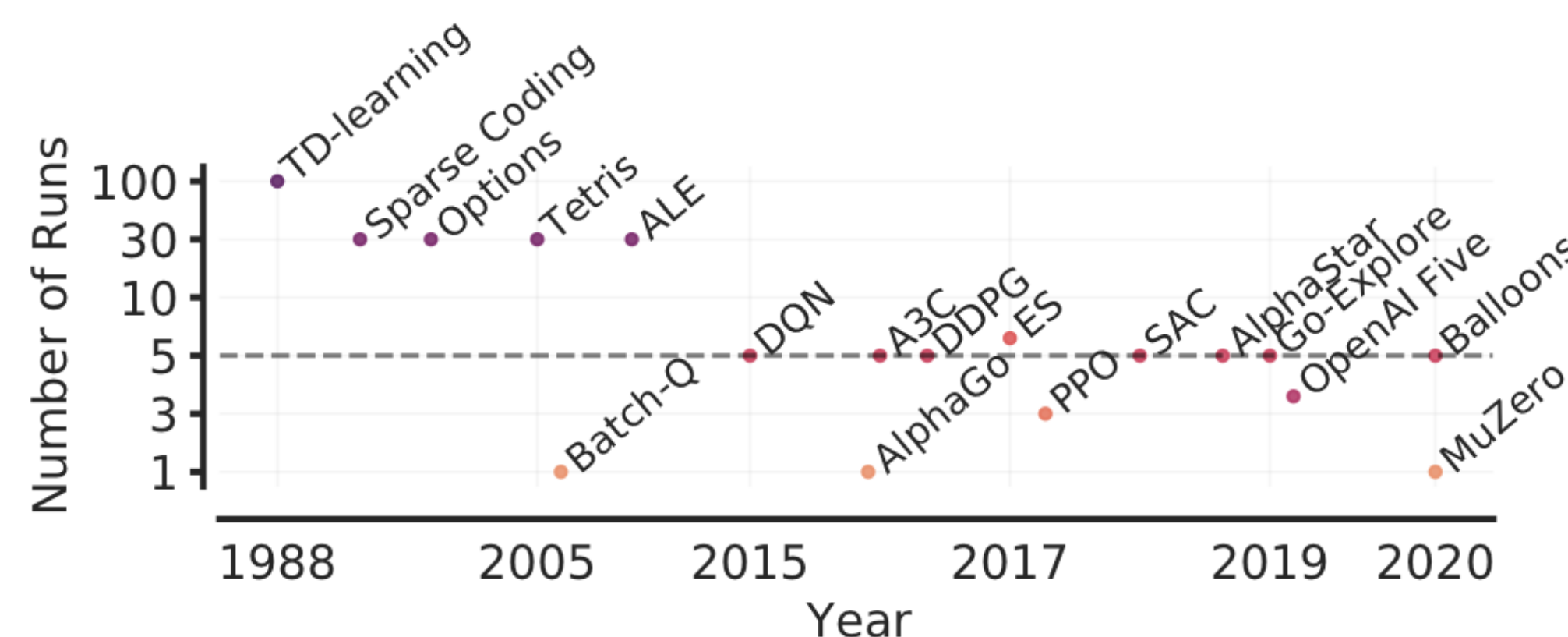
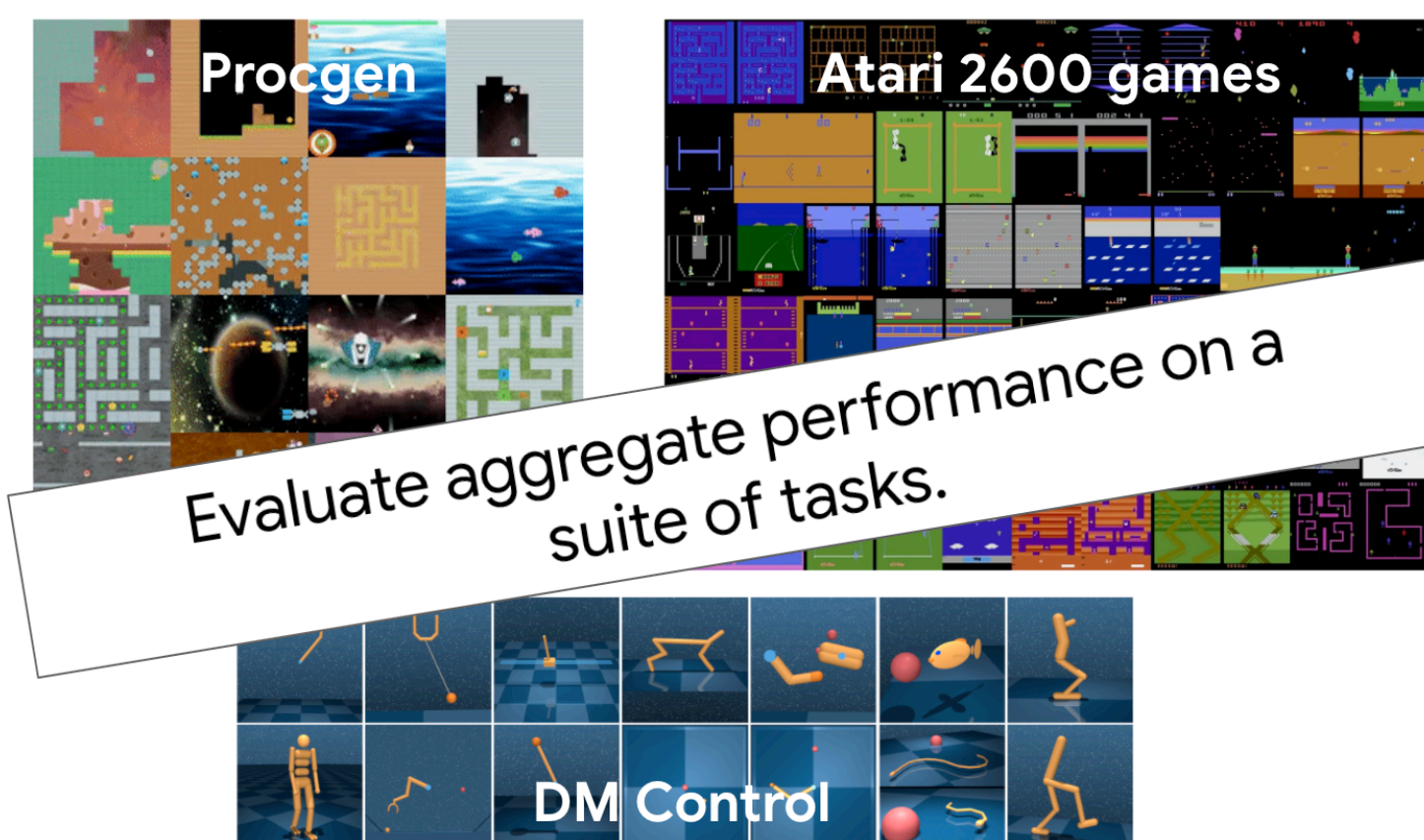


# Deep RL at the Edge of the Statistical Precipice

Rishabh Agarwal, Max Schwarzer, Pablo Samuel Castro, Aaron Courville, Marc G. Bellemare

## Statistical Uncertainty in Deep RL Exacerbated by Handful of Runs

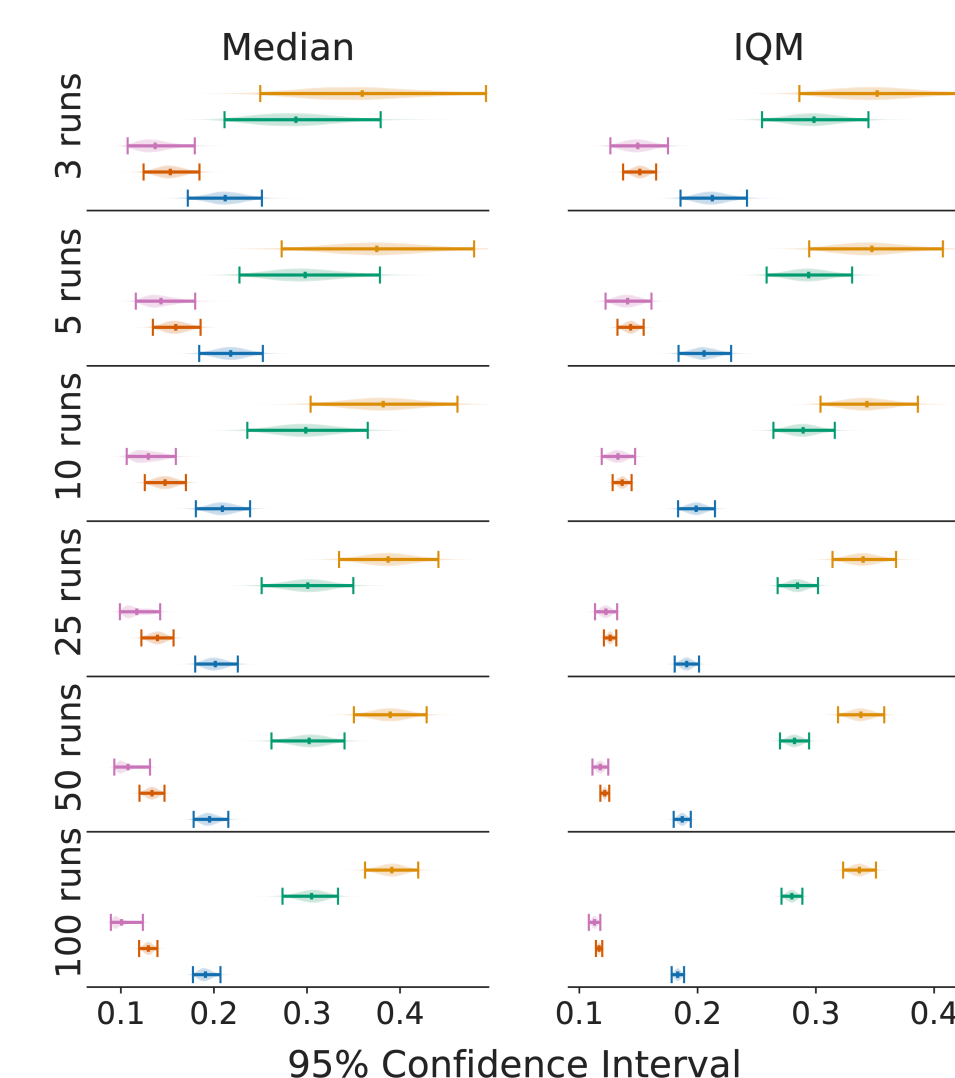
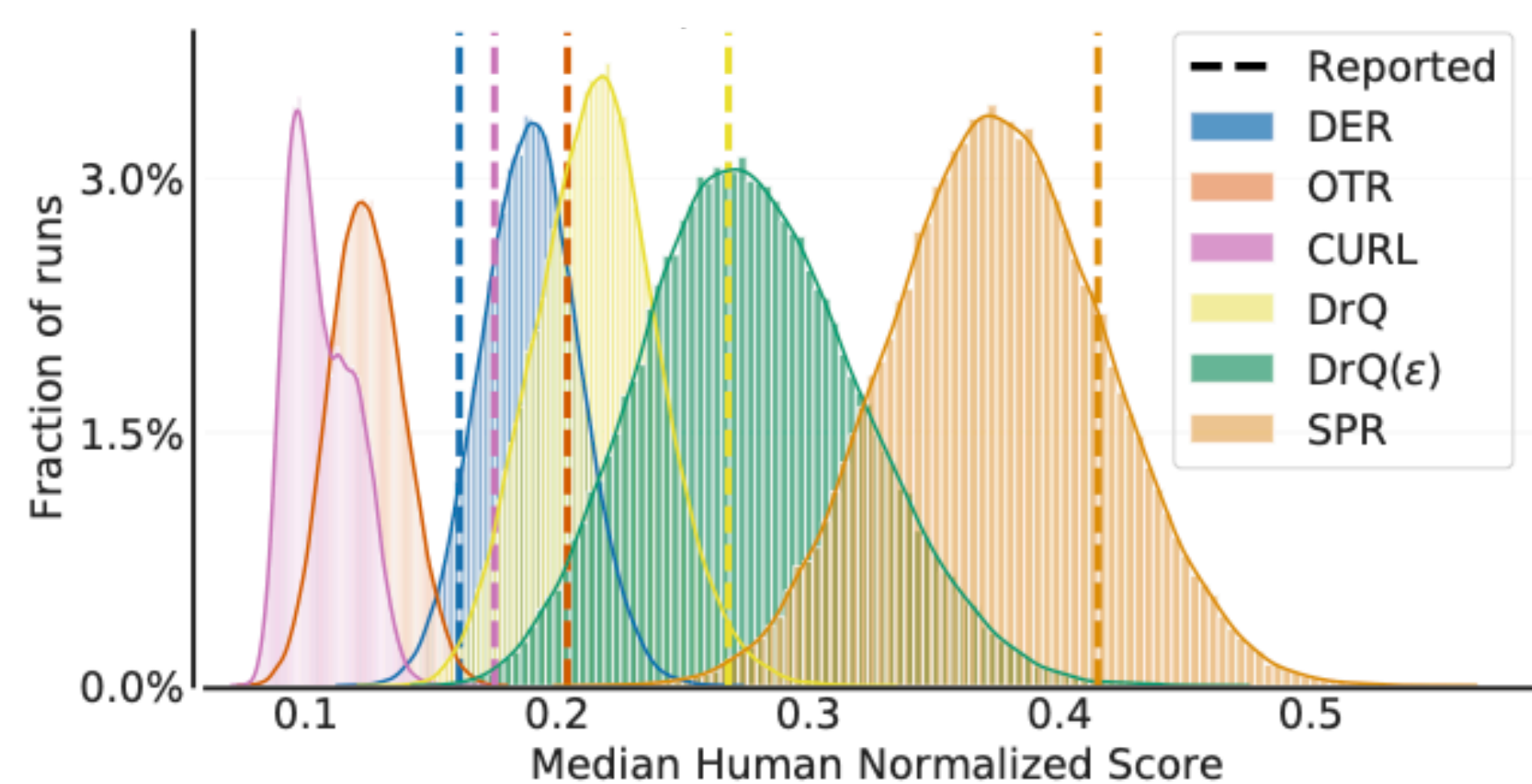


## How to Reliably Evaluate Performance in Deep RL?

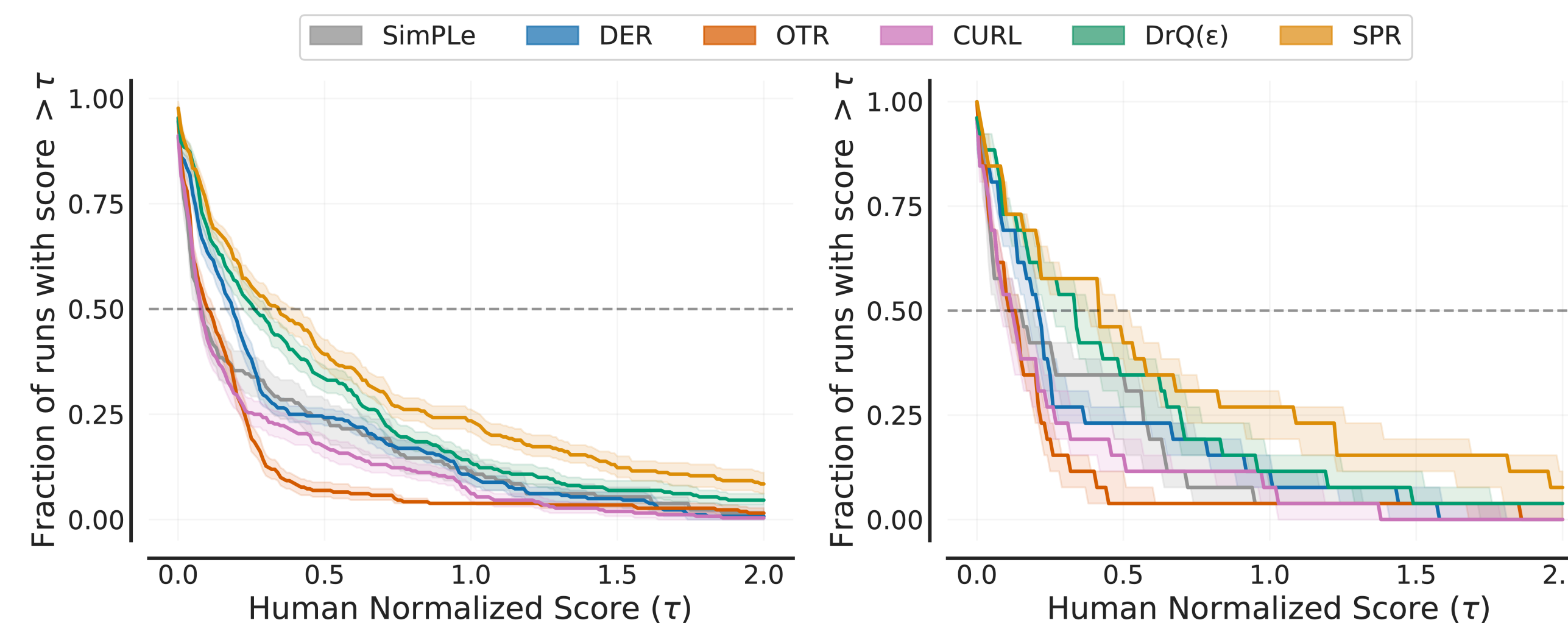
Performance estimates based on a finite number of runs is a random variable and should be treated as such.

- Use interval estimates as opposed to point estimates for accounting for uncertainty in results.
- More is more: Performance profiles for qualitative summarization
- Better aggregate performance measures from robust statistics such as interquartile mean (IQM) and probability of improvement.
- Provide individual runs for thorough statistical comparisons.

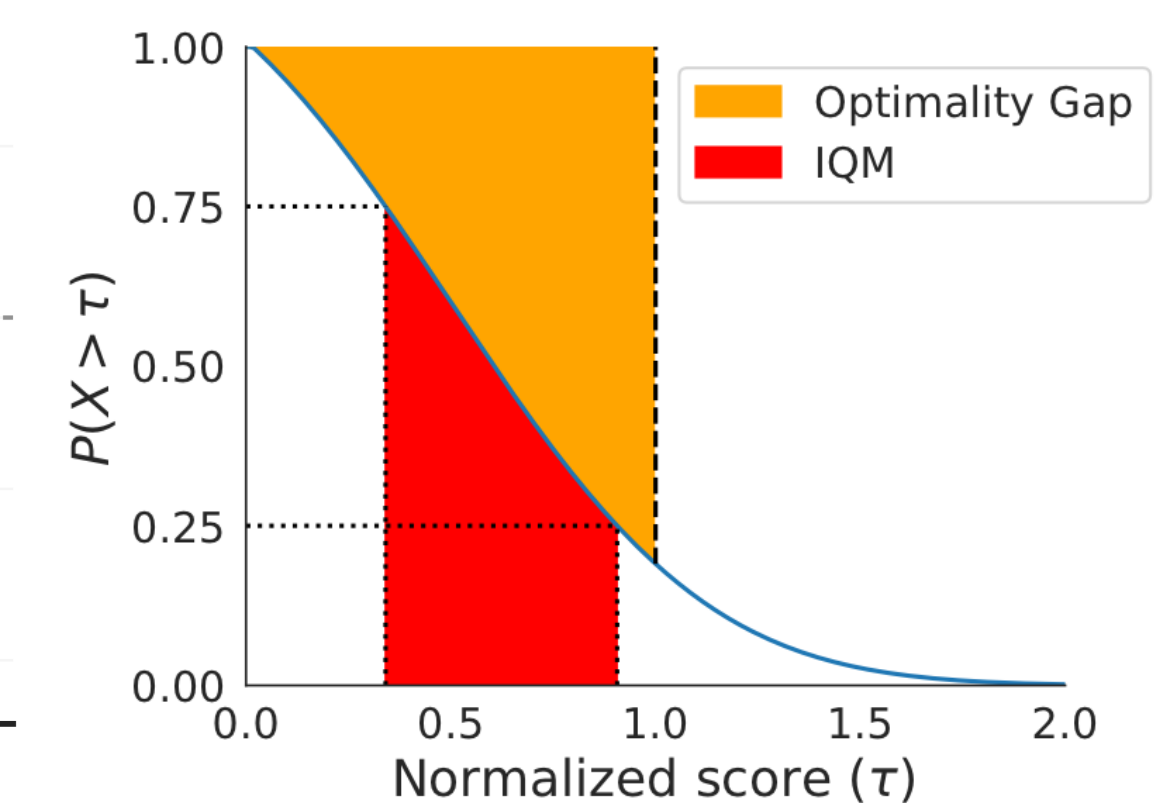
## Report Interval Estimates rather than Point Estimates.



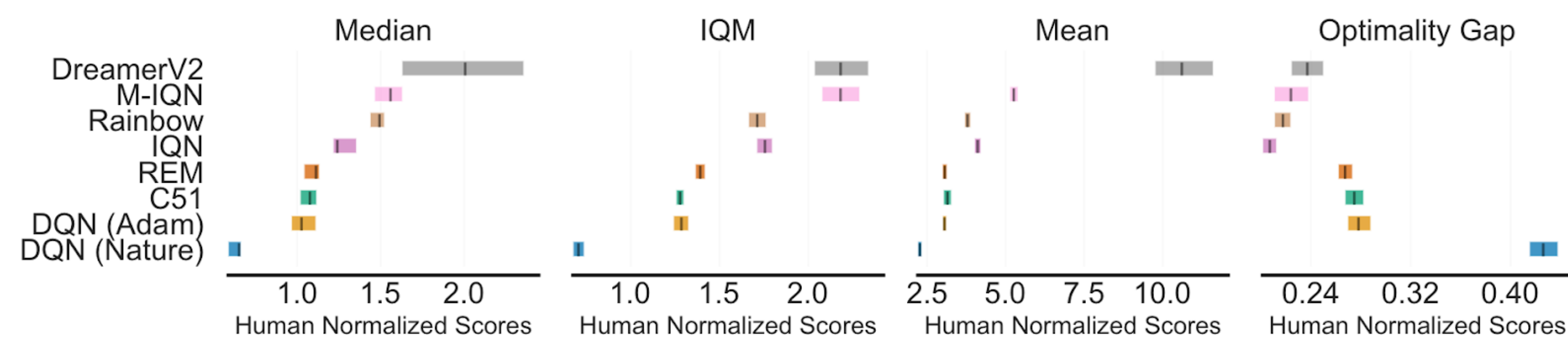
## Performance Profiles for a Bird's Eye View.



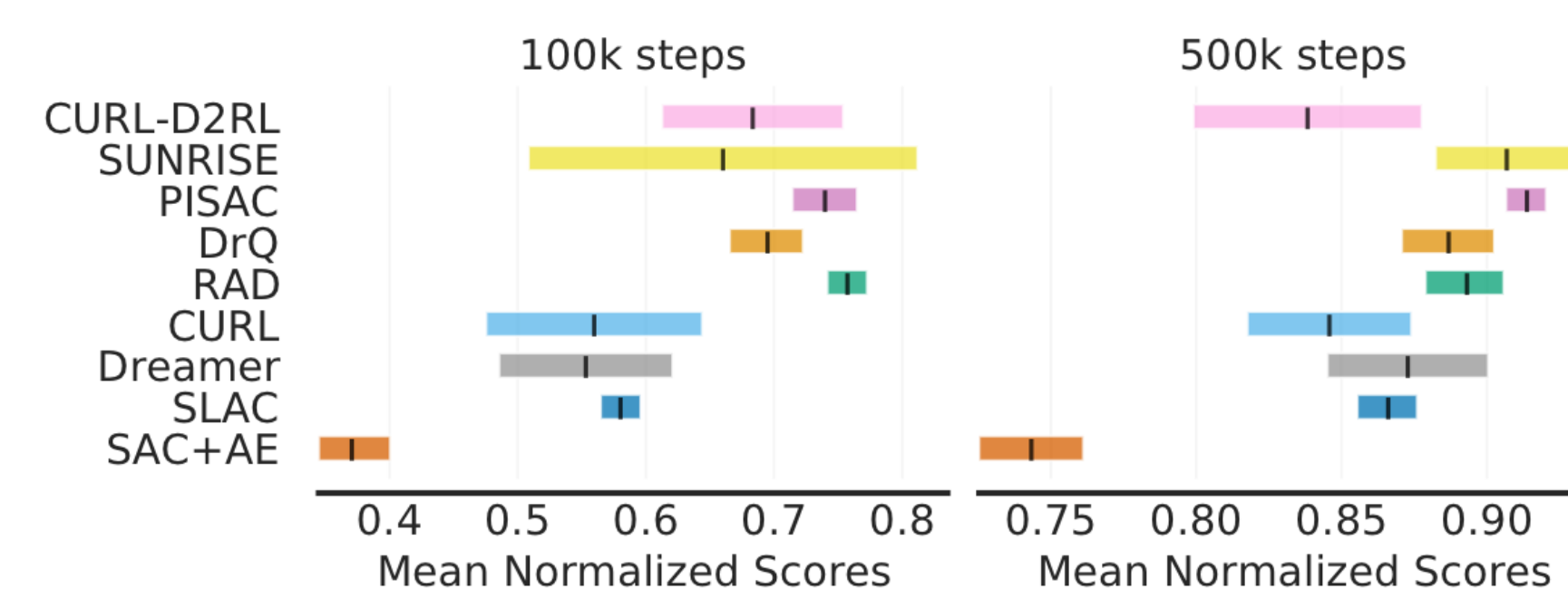
## Statistically Robust and Efficient Aggregate Metrics



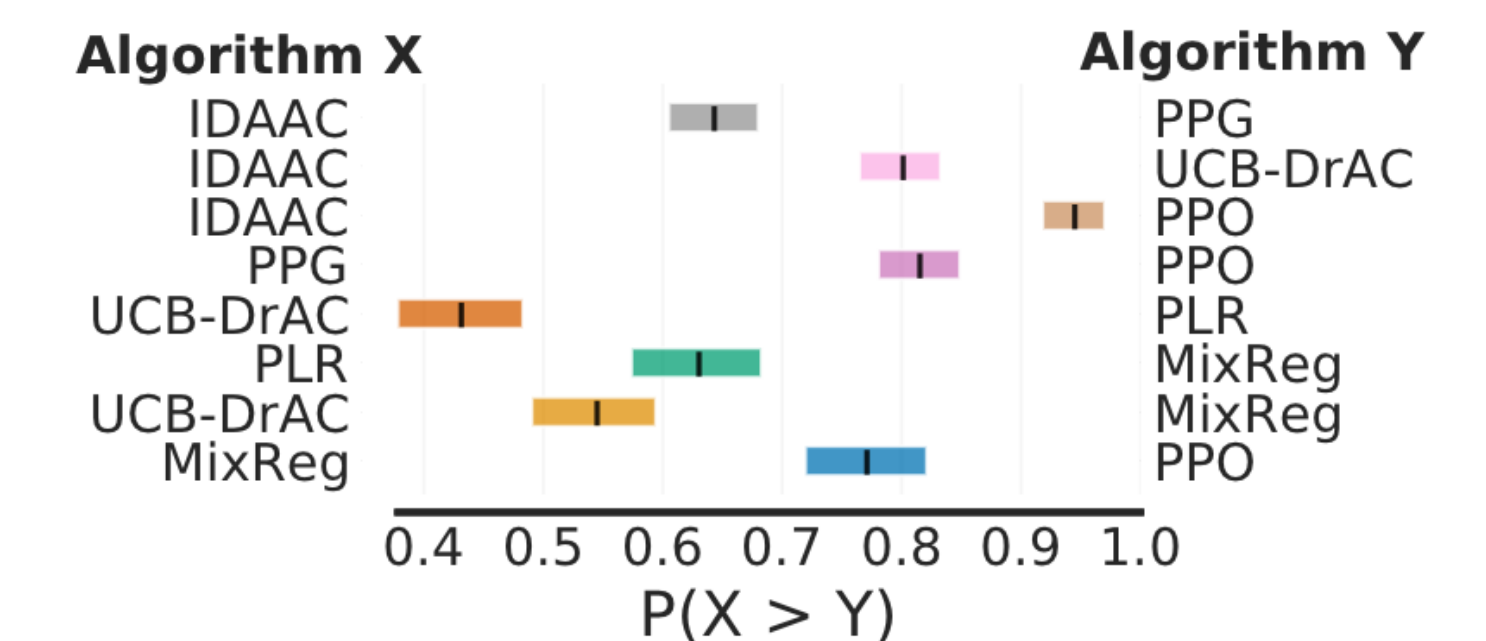
## Re-evaluating Performance on Popular Deep RL Benchmarks



Atari 2600 Games



DM Control



ProcGen